

Raising Aliens

Subject: Life science

Grade: 6-8

Lesson Topic: Plant Growth & Development

Length: Variable*

* Projects may take several weeks to a year, but after they are in process, sometimes only a half period per week is needed to maintain the project. The plants may be used in conjunction with future activities.

Learner Objective:

The students will:

- draw and describe a seed.
- describe how seeds and fruits help with seed dispersal.
- sprout seeds and grow a plant.
- record data over a long period of time and use these data to make a graph.
- draw and describe the structure and function of a flower and its parts.
- use a microscope to observe pollen.
- simulate a weed control method.
- understand and explain why noxious weeds are an ecological and economic problem.
- be able to explain chemical, cultural and biological weed control methods.
- identify at least one weed species in the field.
- understand various ways to prevent weed dispersal.
- understand the idea of Integrated Pest Management (IPM.)

Introduction:

This activity may be used prior to all other *Alien* plant activities as part of your plant biology unit since it involves plant growth and development. Modifications (regarding information about invasive species) will have to be made, but because this activity involves growing plants and is of long duration, the "killing" portion of the activity may take place by the time you are utilizing all of the *Aliens* curriculum.

Content:

This can be a full year or a half year lab. Select and gather weed seeds from noxious weeds in your area before school starts (some species such as spotted knapweed can be gathered after school starts as the seeds stay in the seed heads). Be careful to prevent weed spread!! You may want the whole class to try all one species, or try several. Try small groups or individual students (fit this to the needs of your students!). Contact your County Weed Coordinator and/or Extension Agent for more information, or check the Resources section of *Aliens*. The students may also use the wealth of information from the weed report they created in the *When Is A Rose Not A Rose* activity. Try growing the species of your choice at least once (or with a small group of students) so you know what to expect when you do the lab with a whole class.

Materials and Supplies:

Student Guide to Raising Aliens (included at end of lesson)

This activity will require a space to grow plants in your room, a greenhouse, or you can have your students build a solar powered cold frame outdoors (see link to building a cold frame on *Aliens* plant curriculum page or in Resources).

Other materials:

weed seeds (you must collect these), safe seed container, grow lights or greenhouse, growing area, pots (many weeds are tap rooted and need deep pots), potting soil or soil, water, rulers, student data notebooks, graph paper, flower and noxious weed literature, Internet access, microscopes, slides, cover slips, lens paper, forceps, stereo scopes and/or hand lenses, various materials to "kill the weed."

Anticipatory Set:

Have a closed box sitting up at the front of the class that is clearly labeled, "Alien Babies: DO NOT DISTURB". Even if you have already been studying invasive weed species the students will still be curious, until you open the box and show them the weed seeds, at which point you'll get a few of the groaners you deserve. But then, let them know they will be growing alien weed species, and that you will trust them to make sure that no aliens escape, in fact, it will be necessary to kill the experiment when they are done.

Activity Outline:

Building a solar powered cold frame plant tender: This cold frame will allow you to start plants and continue growing them after winter begins. The cold frame is made from recycled and found materials...another good way to take care of the Earth while learning about plants! Return to the plant curriculum page of *Aliens* or go to the Resources page for a link to fun project.

Sprouting Seeds: Each weed seed has different needs, and the students can research those needs. To keep costs down, use local soil (free-dug up from the waste areas of the school grounds) for the bottom 3/4 of the pot and sterile potting soil (purchase large bags from a local greenhouse) for the top 1/4th. This potting soil suppresses the unwanted seeds that may sprout from the local soil (see seed bank activity) because they can not push up that high, and thus, and helps sprouting success for the plants you do want. Many weed seeds need to be planted quite shallow, misted and the pot covered with a clear plastic wrap cover until the new sprout is well established. The students can also sprout them in smaller pots (such as plastic cups or yogurt cups) and transplant the best plant at a later date. Better yet, use that new solar powered cold frame!!

Growing the Weed: Make sure the plants have a normal growing environment with constant warmth, grow lights and/or sunlight, water and room to grow (some weeds get quite large!). Unless soil is reused, fertilizer is not usually needed.

Flower Observation: Teach about the structure and function of flowers before this so the students know what to look for. Have drawings or models of flowers for them to refer to and print off some pictures of their actual weed species flowers to help explain the evolutionary modifications that have occurred with each particular species.

Pollen Observation: Make sure the students have used microscopes, slides and cover slips and have observed samples on all powers before you attempt this part. They can either cut off the anthers or just rub the whole flower in the drop of water on the slide. You may want to get other flowers (from your local floral shop, greenhouse or outside in season) to show the variety of pollen.

Kill the Weed: Make sure you have CONTROL of this part of student activity!! Herbicides (plant growth hormones), burning, chopping, etc. are dangerous and must be treated accordingly!! Keep weeds from spreading!! Have the students simulate many of the ways that weeds are controlled.

Disposal and Clean Up: These are noxious weeds and *must not be spread*. Double bag the soil and transport it directly to the land fill for burial. Wash the pots in indoor sinks and sterilize them. Wash and sterilize your growing area. Monitor the area for potential weed sprouts for 10 years!

Raising Aliens Journal – Have the students keep a journal of the activities. You may want to have the students make their own journals. Use the Student Guide to Raising Aliens worksheet (see below) as a guideline for student entries.

Closure and Assessment:

The journals become the assessment for this activity because it includes research, drawings, answering specific questions and reflection. You might schedule specific “journal check dates” according to the sequence of teaching.

Independent Practice and Related Activities:

The “killing” methods investigated provide a perfect platform for older students to create their own programs for eradication of invasive weed species. Many people object to kids being brought in to “pull weeds” when some of the research in this activity will show that pulling weeds is not always effective. Some people object to the use of chemical herbicides. Others object to introducing a non-native pest (insect) to eradicate a weed when there is a chance that the insect may become an invasive species too. Have students investigate these issues and see if they can develop an effective eradication program for a specific weed species.

Resources:

Aliens In Your Neighborhood [Resources](#)

Vocabulary:

None

National Science Education Standards:

Science as Inquiry - CONTENT STANDARD A:

As a result of activities in grades 5-8, all students should develop

- ☐ Abilities necessary to do scientific inquiry
- ☐ Understandings about scientific inquiry

Life Science - CONTENT STANDARD C:

As a result of their activities in grades 5-8, all students should develop understanding of

- ☐ Structure and function in living systems
- ☐ Reproduction and heredity
- ☐ Regulation and behavior
- ☐ Populations and ecosystems
- ☐ Diversity and adaptations of organisms

Science in Personal and Social Perspectives - CONTENT STANDARD F:

As a result of activities in grades 5-8, all students should develop understanding of

- ☐ Personal health
- ☐ Populations, resources, and environments
- ☐ Risks and benefits
- ☐ Science and technology in society

History and Nature of Science -CONTENT STANDARD G:

As a result of activities in grades 5-8, all students should develop understanding of

- ☐ Science as a human endeavor
- ☐ Nature of science
- ☐ History of science

Student Guide to Raising Aliens

Use these instructions as a guide to your journal entries.

1. After having planted the weed seed(s) as instructed and read the information about your weed, you must care for the weed every class day (water if needed, check health, and turn the pot if the light comes from the side). Record the date of each observation in your notebook!
 2. When the weed sprouts, record the date and then sketch and describe its growth once each day.
 3. After the first week of growth you will only take data on your weed once a week. You will: 1) Sketch the plant, 2) measure the height of the longest stem, 3) count the number of stems, and 4) note big changes.
 4. Water, fertilize (if needed) and repot the plant as instructed. Be sure and keep the soil moist but not soggy
 5. When the plant flowers, draw the flower and label the following parts: stem, sepals (these may fall off on some flowers when they bloom), pistil, anthers, and petals. If your plant does not flower by the end of the lab, draw another students flower. Refer to the standard flower drawing in your text.
 6. When several flowers of the group have matured, observe and draw the pollen. To do this, rub the anthers in a drop or two of water on a microscope slide, place a cover slip on the slide and observe on 4X, 10X and 40X. Draw your 4X and 40 X views.
- WARNING: do not let seeds from your noxious weed escape! We must prevent their spread!!**
7. At the end of this lab you will attempt to kill your weed (they may be harder to kill than you think!). Each person will try a different weed control method. List each classmates name and method in your data. Some suggested methods are: 1) apply a herbicide, 2) simulate a wildfire - burn the stems and leaves, 3) defoliate the plant the way a leaf feeding biological control agent might, 4) let a goat or sheep eat the stems and leaves - a cultural control method, 5) dig up the plant, chop it up and rebury the parts - to simulate plowing/tilling, 6) Bury whole and chopped plants in a compost pile to see if they actually turn to compost or if they start growing. Do these carefully with teacher supervision! Now water the remains of your plant for 2 more weeks and see if your method really works to kill the plant.
- IMPORTANT WARNING: Dispose of the plant parts and soil as instructed in a manner that prevents the spread of these noxious weeds (disposal in a land fill is one suggestion).**
8. Complete the results, discussion and conclusion.
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Results: In a few sentences, sum your data.

Discussion: Answer these Discussion Items on your own paper.

1. Explain why plants have seeds and fruits with several examples of each.
 2. What is a weed? Why are many plants weeds?
 3. Why are specific noxious weeds in Montana classed as category 1, 2 & 3?
 4. a. Describe how your weed grew (its life stages). b. Make a line graph of the growth of your weed.
 5. Describe the function of each part of your flower (stem, sepals, pistil, anthers, petals and pollen).
 6. Explain: 1) chemical, 2) biological, and 3) cultural weed control.
 7. What is the idea of Integrated Pest (Weed) Management [IPM]?
 8. How can you (yourself!) help: 1) prevent weed spread, and 2) help control weeds already established in your area? Explain several examples of each!
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Conclusion: a minimum of 3 sentences of summary and 3 sentences of your opinion about the lab.

This lab was adapted from curriculum developed by:

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